Remarks

Upon entry of the present Reply, claims 1-22 are pending in the present application.

Claims 1, 4, 7, 8, 10 and 15 are amended herein. Claim 1 is amended to make clear that it is the formed dielectric layer through which the trenches do not extend completely through. This amendment is supported in the application and drawings as originally filed; see, e.g., p. 26 lines 7-14 of the PCT application WO 2005/076681, referring to the dielectric layer.

Rejections of Claims over Konrad et al. in view of Tamm et al.

All of the pending claims stand rejected as obvious over Konrad et al., US 2002/0129972 in view of Tamm et al., US 5666722, and, in some cases, further in view of Yokogawa, US 6740416. Applicant respectfully traverses these rejections of the claims, and requests reconsideration and withdrawal of said rejections, for at least the following reasons.

The Office Action contends that Konrad discloses providing a printed circuit board 1, coating the circuit board with a dielectric 2, structuring the dielectric 2 for producing trenches 3 using laser ablation, the trenches not extending completely through the dielectric, followed by depositing a primer layer and depositing a metal layer.

It appears that the Office Action takes the view that the resin layer 2 on the substrate 1 is a dielectric, and that when the trenches 3 are formed, since they do not penetrate the substrate 1, which is also a dielectric, that the claim limitation that the trenches not extend through the dielectric is met. However, in Konrad et al., the structure corresponding to the presently claimed dielectric is the resin layer 2 and this layer is, in fact, fully penetrated by the trenches formed. Thus, the only way that the trenches formed reasonably can be considered to not extend completely through the dielectric is for the dielectric layer to be considered to constitute the same layer as the substrate. Konrad et al. specifically discloses that the resin 2 may be made of the same material as the substrate 1 [0025]. Konrad et al. discloses that the substrate 1 can act as an automatic etch stop for the laser ablation when the polymer layer 2 and the dielectric substrate 1 are different materials [0031]. In this case, in Konrad et al., the laser ablation forms trenches which extend completely through the layer 2.

Applicant has amended the claims to make clear that the dielectric layer is a separate layer from the substrate, which is a printed circuit board. This fully distinguishes the present invention from Konrad et al., with or without Tamm et al.

Since the dielectric resin layer applied by Konrad et al. does, in fact, contain trenches which extend completely through the dielectric resin layer, it does not and cannot reasonably be contended to meet or render obvious the claim limitation that the trenches not extend completely through the dielectric layer. For this reason alone, the presently claimed invention fully distinguishes over the asserted combination of Konrad et al. and Tamm et al.

In addition, there are a number of further distinctions between the present invention and the asserted combination of Konrad et al. and Tamm et al., with or without the addition of the tertiary reference, Yokogawa. For the following additional reasons, Applicant respectfully traverses the rejection of the claims, and requests reconsideration and withdrawal of said rejections.

The Office Action contends that Konrad et al. would disclose the method as claimed in its entirety as regards the generation of trenches, and that Tamm et al. further disclose producing vias. Therefore. the Office Action's opinion must be based upon the contention that Konrad et al discloses that the method in step a) comprises providing a printed circuit board.

However, Konrad et al. clearly states that the substrate 1 (Fig. 1a) is a rigid dielectric substrate of a first polymeric material. It may be a thermoplastic resin or a thermosetting resin and may be reinforced with glass fibers or glass fabric [0018]-[0022]. It will be clear to those skilled in the art that the substrate Konrad et al. disclose is not a printed circuit board since a printed circuit board is a structure which - apart from comprising a dielectric and being reinforced with glass fibers or glass fabric - in all events comprises electrically conductive structures which serve to interconnect various electric components mounted on the printed circuit board. In sharp contrast thereto, the dielectric substrate of Konrad et al. will be understood to those skilled in the art to be a mere dielectric substrate without any electrically conductive structures.

Furthermore, Konrad et al. are silent as to the possibility to provide the dielectric substrate on a printed circuit board. Therefore, the dielectric substrate as disclosed by Konrad et al. and a printed circuit boards as required in method step a) in the present invention are clearly distinct. It is for this reason that there is this further difference between the present invention and the method of Konrad et al. - apart from Konrad et a!. not disclosing the production of vias.

Hence, the present invention requires starting the process with a printed circuit board. This offers the advantage that it will be much more efficient to have part of the interconnections between the electronic compounds in a printed circuit board rather than starting with a dielectric substrate as Konrad et al. do. This is because producing

the circuit carrier in accordance with the teaching of Konrad et al. would mean that all interconnections have to be produced with their method. In contrast, if the method of the invention is used, most of the interconnections may be provided by the printed circuit board. The method of Konrad et al. of manufacturing the circuit structures (conductor lines in trenches and through connections in vias) is able to generate very dense circuitry. This method is very complicated and expensive, because all circuitry layers have to be produced sequentially, whereas in producing printed circuit boards a conventional technique may be employed wherein all layers are produced simultaneously using a conventional mass producing technique and are thereafter laminated together (only at the end of the manufacturing sequence terminating circuitry layers are formed on the outer sides of the laminate). For this reason, the method of Konrad at al will result in a much lower yield in producing circuit carriers than the method of the invention.

Therefore, there are considerable differences in the structures and functions of the dielectric substrate of Konrad et al. on the one side and the printed circuit board of the present invention on the other side: The dielectric substrate of Konrad et al. is obviously simply needed exclusively to carry the resin layer and to form the bottom of the trenches formed in the resin layer. The printed circuit board of the method of the invention by contrast takes over most part of the interconnections needed in the circuit carrier to be produced. The outer circuitry formed with the method of the invention (forming an additional dielectric layer on the printed circuit board, producing trenches and vias therein and conductor structures in the trenches and vias) then mostly serves to accommodate the small pitch of electronic components which could otherwise not be produced at a sufficiently high yield.

Therefore, the method of the invention has the advantage of manufacturing circuit carriers at a much higher yield than the method of Konrad et al while making possible a small pitch on the outer sides of the circuit carrier.

The method of the present invention requires that the trenches do not completely extend through the dielectric layer. Otherwise, the conductor lines produced in the trenches would generate a short circuit to any of the conductor structures being exposed on the outer surfaces of the printed circuit boards underlying the dielectric layer. Konrad et al. do not require or suggest that the trenches do not completely extend through the resin layer 2, because the dielectric substrate 1 is merely a dielectric layer and does not comprise any conductor structure. Konrad et al. specifically teaches that the trenches penetrate entirely through the layer 2, and the claims of the present

application specifically require that the trenches not penetrate the corresponding dielectric layer.

For these additional reasons, Applicant respectfully submits that the presently claimed invention would not have been obvious over the asserted combination of prior art references. Accordingly, Applicant respectfully requests reconsideration of the application, withdrawal of all rejections of the claims, and allowance of the presently pending claims. Notice to such effect is respectfully requested.

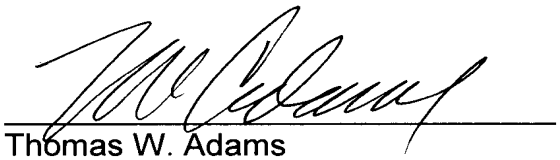
CONCLUSION

Claims 1-22 are believed to be in condition for allowance. Notice to such effect is respectfully requested.

In the event any issues remain in the application, or if the Examiner considers that a telephone interview would facilitate the examination process, Applicant's undersigned attorney invites the Examiner to telephone him at the Examiner's convenience.

In the event any additional fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to our Deposit Account No. 18-0988 under Attorney Docket No. **EFFEP0101US**.

Respectfully submitted,
RENNER, OTTO, BOISSELLE & SKLAR, LLP



Thomas W. Adams
Reg. No. 35,047

1621 Euclid Avenue, 19th Floor
Cleveland, Ohio 44115
Tel: 216-621-1113
Fax: 216-621-6165

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